

SOCIB Glider toolbox: from sensor to data repository

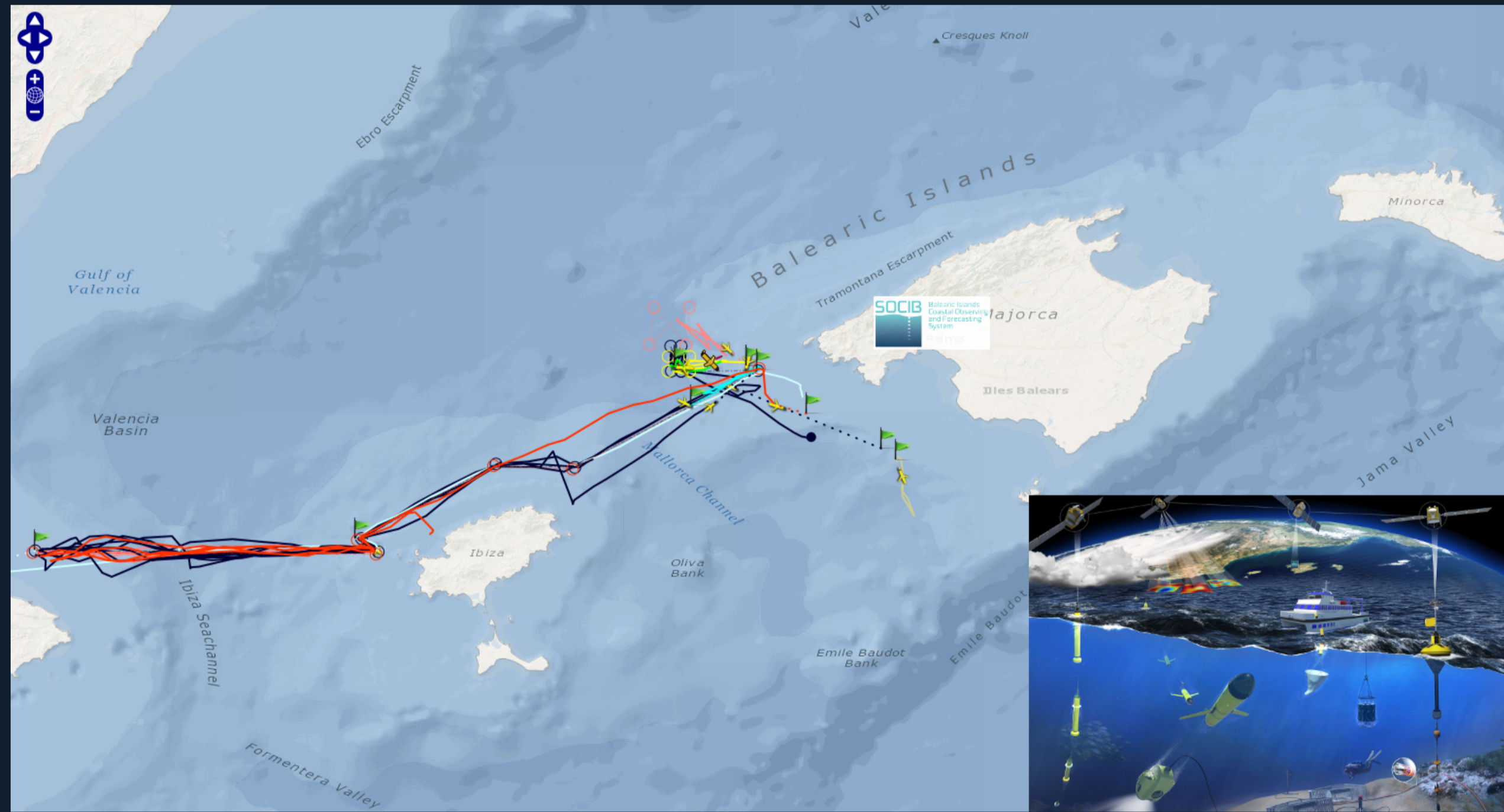
1 Why a Glider Toolbox?

Because of the file format and the mismatch between the scientific and navigation time systems, the processing data from a glider fleet is far from being an easy task. The SOCIB glider toolbox is a set of MATLAB/Octave scripts and functions that covers the main stages of the data management process.

The toolbox is available at <http://www.socib.es/users/ glider/ glidertoolbox> 

2 About the developers

SOCIB is a multi-platform Marine Research Infrastructure located in the Mediterranean Sea. Over the last years, SOCIB has acquired an extensive experience in glider technology, both with *Slocum* and *Seagliders* platforms (Cusi et al., 2012).



Quasi-continuous glider missions have been carried out in the *Ibiza Channel* since 2011 to better understand the mesoscale variability in the Balearic Channels (Heslop et al., 2012). Since then:

- over 55 deployments performed,
- over 900 days and 10000 nautical miles at sea,
- more than 26000 profiles collected.

3 What's inside the toolbox?

The toolbox contains the necessary tools to get standardized netCDF files and figures displaying the data from the raw files generated by the platforms and sensors. It enables the processing of both *Slocum* and *Seaglider* data, in real-time or delayed mode, and suits to scientists or data centres. It offers advanced data improvements, such as the thermal lag correction (Garau et al., 2011).

3.1 Processing levels

Three levels of for the netCDF files:

Level 0: contains exactly the same data as the raw files.

Level 1: contains the processed glider data: sequences of measurements along the glider trajectory, with interpolated position coordinates, unit conversions, filters and/or corrections.

Level 2: contains the processed level 1 data in a *gridded* format: : vertical profiles, interpolated onto a user configured vertical grid.

3.2 Processing steps

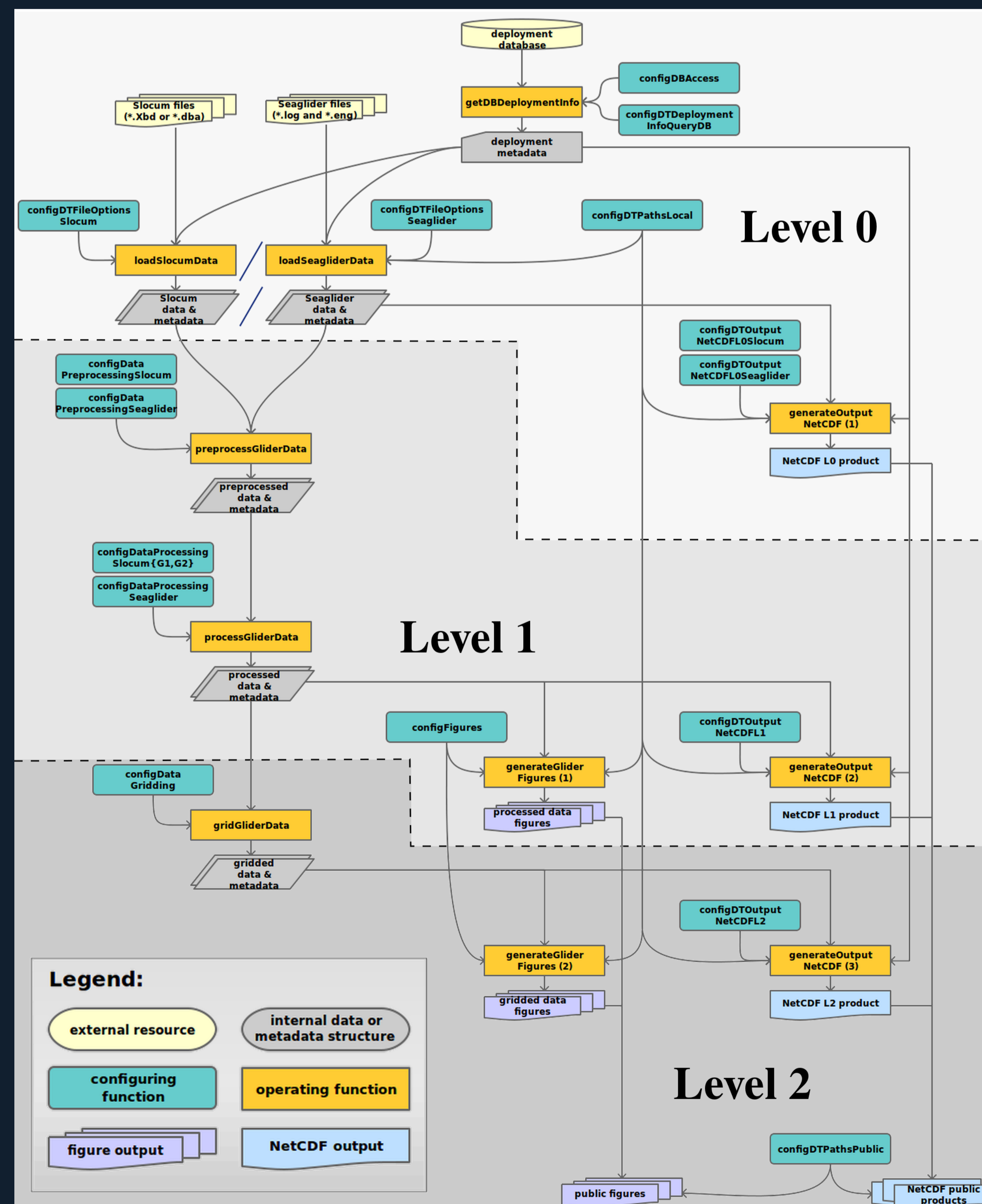
- 1 Data **retrieval** (level 0): download of raw binary files from remote dock servers or base stations and conversion into a human readable format.
- 2 **Preprocessing** of raw data: application of simple unit conversions and factory calibrations are applied.
- 3 **Processing** (level 1): interpolation of reference coordinates (time, position, ...), general sensor processing (sensor lag correction, interpolation, ...), CTD data processing (pressure filtering, thermal lag correction, ...), derivation of new measurements (depth, salinity, density, ...)
- 4 **Gridding** (level 2): interpolation/binning of the level 1 data to have the data as instantaneous vertical profiles (unique longitude-latitude pair for each profile).

3.3 Toolbox diagram

Diagram: steps to go from deployment database to graphical outputs and netCDF products. It reads *easily* if you follow the color code:

operating functions
configuring functions
netCDF output

external resource
internal data/metadata structure
figure output

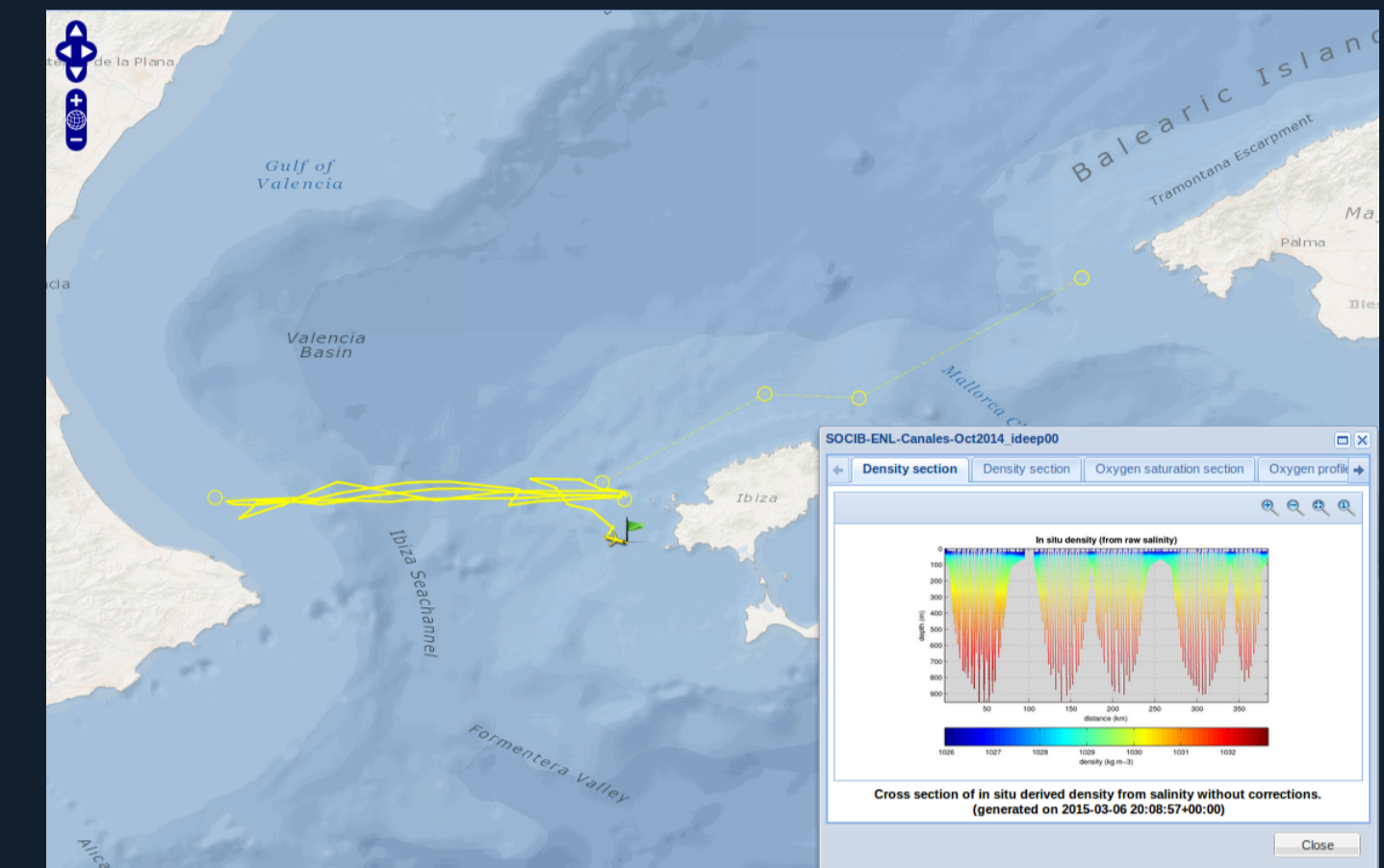


4 How are we using the toolbox?

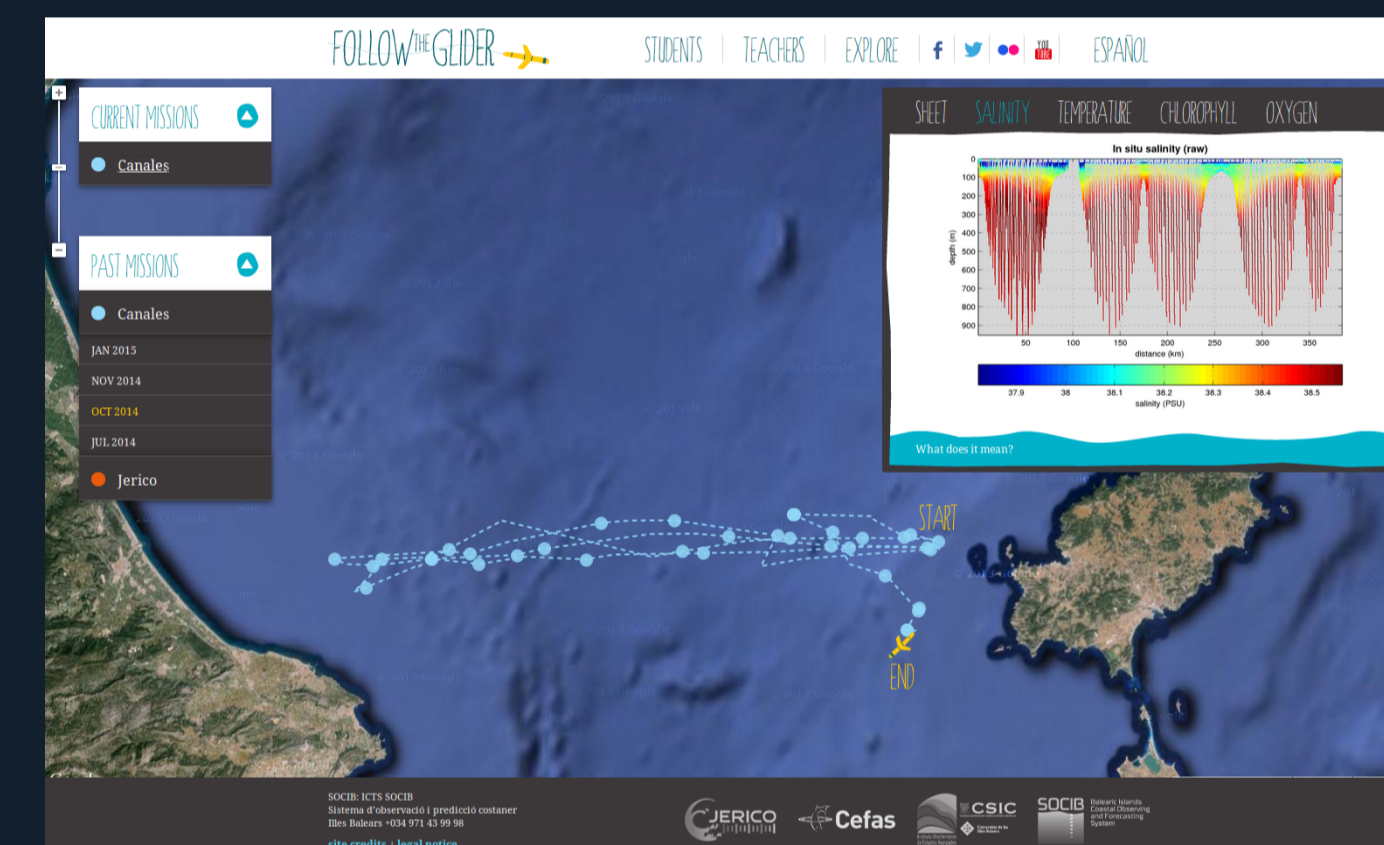
In addition to the data file preparation for scientists, the toolbox is routinely used to manage all our deployments. The data files in netCDF and the figures are accessible through various in-house applications.

4.1 Deployment Application (Dapp)

Dapp (<http://apps.socib.es/dapp/>) is the application used to visualise all the mobile platforms. The figure shows an example for the CANALES-October2014 mission. From the applications, links to download the NetCDF files are provided, as well as figures showing the glider measurements during the mission.



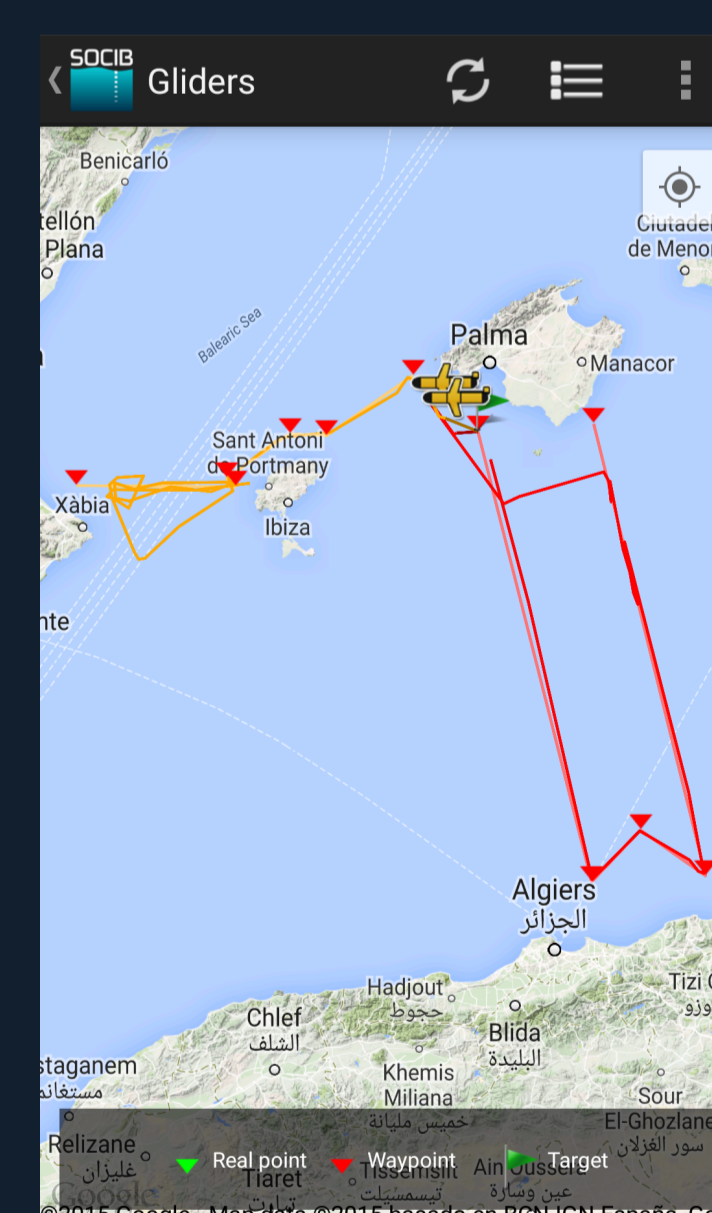
4.2 Follow the Glider web



Follow the Glider (<http://followtheglider.socib.es/>) is an application for the discovery of glider data specifically designed for students and teachers. The same mission in the Ibiza Channel is presented. The salinity data are presented in the sub-plot. All the past and current missions are available.

4.3 App for smartphones

Our App offers access to all the data managed by +++our facilities, be they from fixed stations, mobile platforms (drifters, profilers, gliders, ...), or even numerical models. Once a deployment has started, the positions directly appear on the map in the app.



Acknowledgements: This toolbox is based on the previous code developed at IMEDEA and SOCIB by T. Garau. The development of the toolbox also benefited from Perseus FP7 project. The toolbox is provided to the scientific community for download and use under the GNU licence (<http://www.gnu.org/copyleft/gpl.html>) or EUPL1.1 (<https://joinup.ec.europa.eu/software/page/eupl>).

References

- Cusi, S.; Torner, M.; Martínez-Ledesma, M.; Roque, D.; Beltran, J.; Ruiz, S.; Casas, B.; Castilla, C.; Lizaran, I.; Lora, S.; Heslop, E. & Tintoré, J. On the setup of an operational autonomous underwater glider facility. *5th MARTECH International Workshop On Marine Technology*, 2013, 28-31.
- Garau, B.; Ruiz, S.; Zhang, W. G.; Pascual, A.; Heslop, E.; Kerfoot, J. & Tintoré, J. Thermal Lag Correction on Slocum CTD Glider Data. *J. Atmos. Oceanic Tech.*, 2011, **28**, 1065-1071. doi:10.1175/jtech-d-10-05030.1
- Heslop, E.; Ruiz, S.; Allen, J.; López-Jurado, J. L.; Renault, L. & Tintoré, J. Autonomous underwater gliders monitoring variability at "choke points" in our ocean system: A case study in the Western Mediterranean Sea. *Geophys. Res. Lett.*, 2012, **39**, L20604. doi:10.1029/2012GL053717

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